

Karin C. Knudson

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EDUCATION

B.A. in Mathematics and Religion, June 2009

Williams College, Williamstown, MA.

Magna Cum Laude, Honors in Mathematics, Phi Beta Kappa, Sigma Xi

M.A. in Mathematics, December 2012

Ph.D. in Mathematics, December 2014 (Advisors: Rachel Ward and Jonathan Pillow)

The University of Texas at Austin, Austin, TX.

TEACHING AND RESIDENTIAL LIFE EXPERIENCE

Instructor of Mathematics, Statistics, and Computer Science – Phillips Academy 2014 - Present. Taught courses in AP Calculus, AP Computer Science, Precalculus, Multivariable Calculus and Linear Algebra. Created and delivered honors elective in Bayesian Statistics. Chaired computer science curriculum re-design committee. Co-directed 3-season Outdoor Pursuits program. Served as house counselor and advisor.

Teaching Assistant – The University of Texas at Austin, F2010, S2011, F2012, S2014
Planned and conducted biweekly discussion sections for undergraduate math courses: Integral Calculus, Honors Differential Equations, and Mathematical Biology. Most recent overall student ratings: 4.8 and 4.9 out of 5 (see student comments, attached).

Curriculum Advisor – Exploration Summer Programs, 2013 - 2014

Advised and mentored college student teachers in planning curricula for various summer math and science courses students in 4th – 12th grade. Planning curricula independently for new “Make It Fly” and “Take Stuff Apart” courses, 2014.

Coordinator, Saturday Morning Math Group - The University of Texas at Austin, 2013

Organized math department’s outreach program for middle and high school students. Recruited leaders for weekend talks and math circles, publicized events and increased attendance, hosted American Mathematical Competitions.

Mentor, Directed Reading Program - The University of Texas at Austin, 2013

Supervised undergraduate student in independent reading project in harmonic analysis.

Instructor, AP Calculus – Kirby Hall School, 2012-2013

Taught calculus as part time instructor at small, private, K-12 school in Austin, TX.

Resident Assistant – Coastal Studies for Girls, Spring Semester 2012

Supervised fourteen sophomore students during non-class hours at residential semester program focused on science and leadership. Planned and led extra-curricular activities, assisted in math class, supported faculty and led lessons during Leadership Adventure class and outdoor trips (including week-long kayak/camping trip). Co-organized physical education program.

Teacher, Residential Advisor – Exploration Summer Programs, 2007, 2009

Developed curriculum and conducted three-week math and physics classes for 4th- 7th graders, taught Track and Field mini-courses, planned and instructed non-academic afternoon and weekend activities, and lived in a hall as an RA for 5th and 7th grade girls.

MATHEMATICAL, STATISTICAL AND PROGRAMMING EXPERIENCE

Research Interests: computational neuroscience, compressed sensing, Bayesian statistics, signal processing, mathematical biology.

Graduate Research, The University of Texas at Austin, 2009-2014. Dissertation: *Recovery of Continuous Quantities from Discrete and Binary Data with Applications to Neural Data.*

Peer-reviewed publications:

Knudson, K., Saab, R., and Ward, R. (2016) One-Bit Compressive Sensing with Norm Estimation. *IEEE Transactions on Information Theory*, vol. 62, no. 5, pp. 2748-2758.

Knudson, K., Yates, J., Huk, A., and Pillow, J. (2014) Inferring Sparse Representations of Continuous Signals with Continuous Orthogonal Matching Pursuit. *Advances of Neural Information Processing Systems* 27.

Knudson, K. and Pillow, J.W. (2013). Spike train entropy-rate estimation using hierarchical Dirichlet process priors. *Advances of Neural Information Processing Systems* 26.

Adams, C., and Knudson, K. (2013). Unknotting tunnels, bracelets and the elder sibling property for hyperbolic 3-manifolds. *Journal of the Australian Mathematical Society*: 1-19.

Graduate Fellow in Statistical Consulting, The University of Texas at Austin, Fall 2013

Provided statistical assistance to students and faculty for several projects through short consulting meetings and longer data analysis project. Effectively explained technical statistical concepts to non-experts, and was invited to co-author paper as a result of data analysis project.

Applied Mathematics Summer Research Eaton Peabody Auditory Physiology Laboratory,
Massachusetts Eye and Ear Infirmary, 2010.
Worked in mathematical modeling of otoacoustic emissions.

Research Training Group Fellowship (topology) recipient, 2009-2010, F2011.

Programming Experience: MATLAB, Python, R, Java, JavaScript and HTML/CSS

SELECTED PRESENTATIONS AND TALKS

Spike train entropy-rate estimation using hierarchical Dirichlet process priors, poster presentation, NIPS, December 7, 2013

Multiple Comparison Procedures, *Statistical Consulting Seminar*, UT Austin, October 22, 2013

One Bit Compressed Sensing, Candidacy Talk, UT Austin, April 18, 2013

Spike train entropy-rate estimation using hierarchical Dirichlet process priors, poster presentation, Computational and Systems Neuroscience (Cosyne), March 2, 2013

A Space of Phylogenetic Trees, *Topology Seminar*, UT Austin, November, 2011

Edges, vertices, and a splash of color, Sunday Math Circle, UT Austin, October 2, 2011

Unknotting tunnels in hyperbolic knot complements, Sophex graduate student seminar, UT Austin, November 13, 2009

OTHER EXPERIENCE/CERTIFICATIONS

EMT and Wilderness EMT SOLO Schools, 2016

Climbing Wall Instructor, certified 2016

Yoga Teacher Training – 200 hour, Breath and Body Yoga, 2012

Wilderness First Responder Certificate, SOLO Schools, 2012

Varsity Track and Cross Country, Williams College, 2005-2009 (now an avid marathoner)

Girls on the Run Head Coach, Oak Springs Elementary School, Austin, TX, Fall 2011

Homework Helper, Helping Hand Home for Children, 2009-2010

Private Tutoring, high school geometry, algebra, calculus, chemistry, physics, 2008-present

Peer Writing Tutor, Williams College, 2006-2009

Study Abroad, University of Graz, Austria, Fall 2007

Outdoor Orientation Trip Leader, Instructor for Leaders, Williams College, 2006, 2008

National Outdoor Leadership School (NOLS), Backcountry rock climbing course, WY, 2005